State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME

STANDING STOCKS OF FISHES IN
SECTIONS OF LITTLE LAST CHANCE
CREEK, PLUMAS COUNTY, 1988

by

Charles J. Brown
Bay-Delta and Special Water Projects Division

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OF LITTLE LAST CHANCE CREEK, PLUMAS COUNTY, 1988

INTRODUCTION

The Department of Water Resources (DWR) initiated an instream flow program in 1976 to identify streams that would benefit from flow enhancement and to assess instream values. The Northern District of DWR selected Little Last Chance Creek below Frenchman Reservoir (Figure 1) as one of the streams to study under this program.

Department of Fish and Game (DFG) biologists studied trout populations in Little Last Chance Creek in 1976 and 1986. Rainbow trout (Oncorhynchus mykiss) and brown trout (Salmo trutta) were the only game fish caught each year. Sacramento suckers (Catostomus occidentalis) were also caught each year (Brown 1976 and Bumpass et al. 1989).

The purpose of this study is to report the results of periodic fish sampling at established stations in Little Last Chance Creek for the purpose of evaluating the effects of the operation of Frenchman Reservoir on populations of trout in the creek.
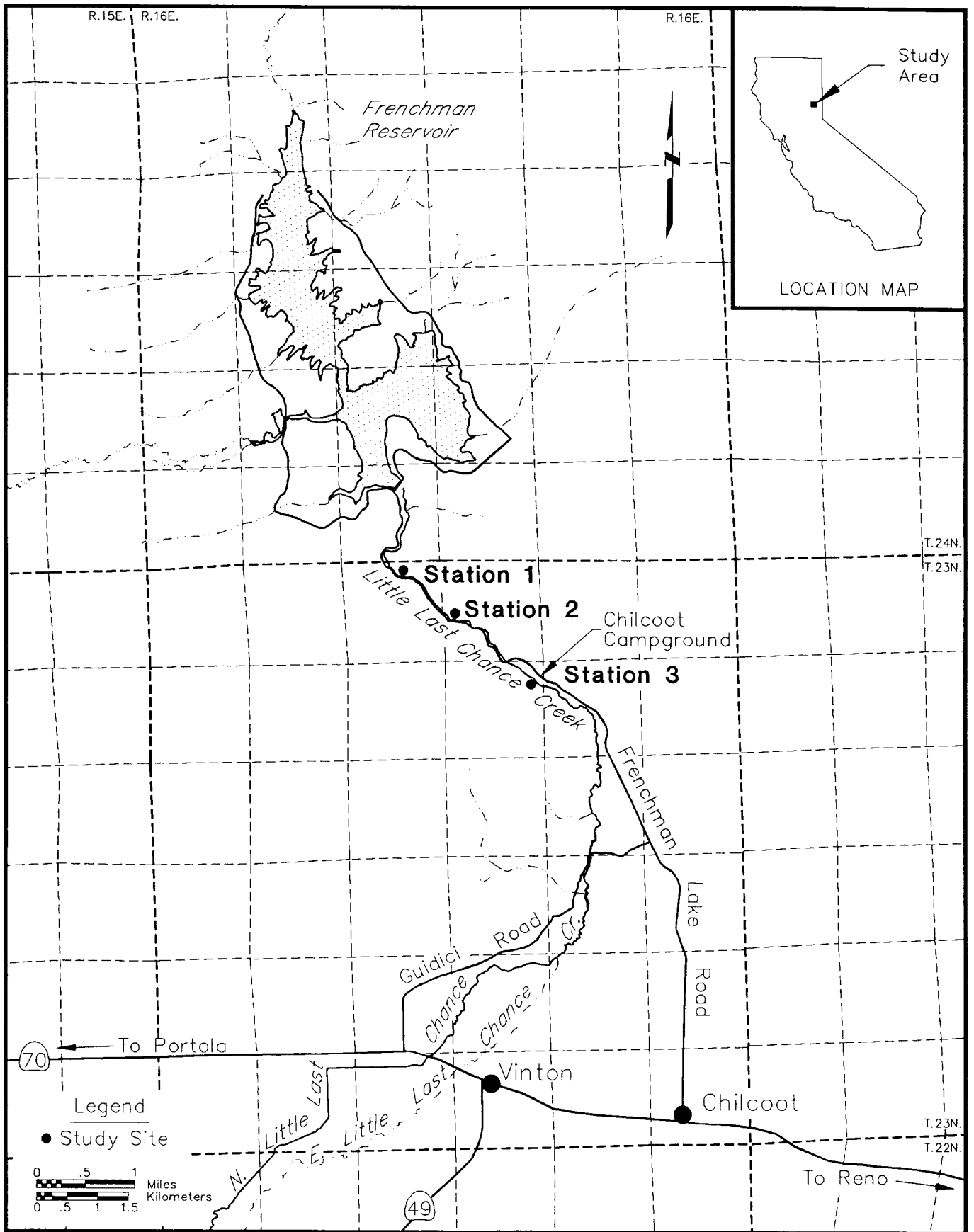
Figure 1. Stations Sampled to Estimate Standing Stocks of Fish in Little Last Chance Creek, Plumas County, 1988.

METHODS

Standing stocks of fishes were estimated at three stations in Little Last Chance Creek (Figure 1) in Plumas County. Stations were intentionally selected to be near stations sampled in previous DFG studies (Appendix 1). Markers had previously been placed in trees along the stream to identify station boundaries. Stations varied in length from 40.9 to 51.2 m. The length, average width, and average depth of each station was measured. Fish were captured with a battery-powered backpack electroshocker in stream sections blocked by seines. Captured fish were removed from the net-enclosed section on each pass. Standing stock estimates were developed using the two-count method of Seber and LeCren (1967) or the multiple-pass method of Leslie and Davis (1939) with limits of confidence computed using a formula proposed by DeLury (1951).

The weights of brown trout, rainbow trout, and Sacramento sucker were determined by displacement. Weights were measured for all fish caught. Fork length (FL) of each fish caught was measured to the nearest millimeter.

Scale samples were taken only from brown trout and rainbow trout over 100 mm in length. Scales were mounted dry between microscope slides, and their images were projected on a NCR microfiche reader at a magnification of 42x. Scale measurements

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for the calculation of growth were recorded to the nearest milli-meter along the anterior radius of the anterior-posterior axis of the scale.

Geometric mean functional regressions were used to describe the body-scale and length-weight relationships (Ricker 1975). Estimation of true mean growth rate was calculated using methods of Ricker (op. cit.).

Distribution of all fish caught is listed according to location. Standing crops of brown trout and rainbow trout were calculated for individual stations where the species of interest were caught and combined for the entire creek. Age and growth were calculated for the population. Mean individual growth was calculated only for brown trout and rainbow trout. Length-weight relationships were determined for brown trout and rainbow trout in Little Last Chance Creek. The coefficient of condition and 95 percent confidence intervals were calculated for both brown trout and rainbow trout.

RESULTS

Distribution

Brown trout and rainbow trout were caught at stations 1 through 3. Sacramento suckers were caught at station 3 (Table 1).

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TABLE 1. Distribution of Fishes in Sections of Little Last
          Chance Creek, Plumas County, 1988.

| | Station Number | | |
	1	2	3
Distance below Frenchman Dam (km)	1.6	3.2	4.4
Brown trout	X	X	X
Rainbow trout	X	X	X
Sacramento sucker			X

Standing Crop

Rainbow trout were the most common game fish caught in
Little Last Chance Creek. Rainbow trout biomass averaged
6.5 g/m^2 at three stations. Biomass of rainbow trout large
enough for most fishermen to catch and keep ("catchable trout"
are at least 127 mm FL) averaged 5.6 g/m^2 (Table 2). Brown trout
biomass averaged 5.5 g/m^2, while biomass for catchables averaged
3.8 g/m^2 (Table 3).

Sacramento sucker was the only non-salmonid fish caught in
Little Last Chance Creek. Biomass was 3.8 g/m^2 at one station
(Table 4).

TABLE 2. Estimate of Rainbow Trout Standing Crop in Little Last Chance Creek, Plumas County, 1988.

Distance Below Frenchman Dam (km)	Population Estimate	95% Confidence Interval	Biomass (g/m)	Estimate of Catchable Trout ($\geq$127 mm FL)	Biomass of Catchable Trout (g/m^2)
1.6	46	45-49	12.0	22	11.3
3.2	60	56-67	5.6	19	4.4
4.4	24	22-30	2.0	8	1.2

TABLE 3. Estimate of Brown Trout Standing Crop in Little Last Chance Creek, Plumas County, 1988.

Distance Below Frenchman Dam (km)	Population Estimate	95% Confidence Interval	Biomass (g/m^2)	Estimate of Catchable Trout ($\geq$127 mm FL)	Biomass of Catchable Trout (g/m^2)
1.6	7	7-8	6.5	3	6.2
3.2	20	17-29	5.1	5	3.3
4.4	35	35-37	4.9	6	1.9

TABLE 4. Estimate of Standing Crop of Nongame Fishes in Little Last Chance Creek, Plumas County, 1988.

Distance Below Frenchman Dam (km)	Species	Population Estimate	95% Confidence Interval	Biomass (g/m^2)
4.4	Sacramento sucker	46	40-58	3.8

The formula L = 1.6 + 0.2 S describes the relationship
between the fork length (L) and enlarged scale radius (S) of 64
rainbow trout caught in Little Last Chance Creek. The co-
efficient of correlation (r^2) is 0.75. The formula was L = 8.1 +
0.2 S for 26 brown trout caught in Little Last Chance Creek,
while the value for r^2 is 0.75. Instantaneous population growth
rate for age interval 1-2 brown trout was greater than for age
interval 1-2 rainbow trout. Instantaneous mean individual growth
rate was also higher for age interval 1-2 brown trout (Table 5
and Table 6).

TABLE 5. Growth Rates for Rainbow Trout Caught in Little Last Chance
Creek, Plumas County, 1988.

Age Interval	Population Growth			Mean Individual Growth		
	Length Interval (mm)	Difference of Natural Logarithms	Instantaneous Growth Rate Gx	Length Interval (mm)	Difference of Natural Logarithms	Instantaneous Growth Rate Gx
1-2	91-175	0.654	1.897	102-175	0.540	1.566

TABLE 6. Growth Rates for Brown Trout Caught in Little Last Chance Creek,
Plumas County, 1988.

Age Interval	Population Growth			Mean Individual Growth		
	Length Interval (mm)	Difference of Natural Logarithms	Instantaneous Growth Rate Gx	Length Interval (mm)	Difference of Natural Logarithms	Instantaneous Growth Rate Gx
1-2	96-191	0.688	2.064	100-191	0.647	1.941
2-3	199-274	0.361	1.083	201-274	0.310	0.930

Age 1+ rainbow trout averaged 145 mm FL. Age 2+ rainbow trout averaged 227 mm FL (Table 7). Age 1+ brown trout averaged 182 mm FL. Age 2+ and 3+ trout averaged 252 mm FL and 327 mm FL respectively (Table 8).

TABLE 7. Calculated Fork Length of Rainbow Trout from Little Last Chance Creek, Plumas County, 1988.

Age	Number of Fish	Length at Capture (mm)	Calculated Lengths at Successive Annuli	
			1	2
1	44	145	91	–
2	20	227	102	175
Number of back-calculations			64	20
Weighted means (mm)			94	175
Increments (mm)			94	81

TABLE 8. Calculated Fork Length of Brown Trout from Little Last Chance Creek, Plumas County, 1988.

Age	Number of Fish	Length at Capture (mm)	Calculated Lengths at Successive Annuli		
			1	2	3
1	7	182	96		
2	15	252	100	191	–
3	4	327	101	201	274
Number of back-calculations			26	19	4
Weighted means (mm)			99	193	274
Increments (mm)			99	94	81

Length and Weight

Age group 0+ rainbow trout represented 51 percent of the catch. Ages 1+ and 2+ trout represented 34 percent and 15 percent respectively (Figure 2)(Appendix 2). Age 0+ brown trout made up 62 percent of the catch. Ages 1+ and 2+ fish represented 10 percent and 22 percent, respectively. Age 3+ brown trout made up 6 percent of the catch (Figure 3) (Appendix 3).

The relationship between length (L) and weight (W) of rainbow trout is:

$$Log_{10} \ W = -4.7 + 2.9 \ Log_{10} \ L$$

$$r^2 = 0.99$$

$$N = 138 \ (Figure \ 4) \ (Appendix \ 4)$$

The same relationship for brown trout is:

$$Log_{10} \ W = -4.9 + 3.0 \ Log_{10} \ L$$

$$r^2 = 0.99$$

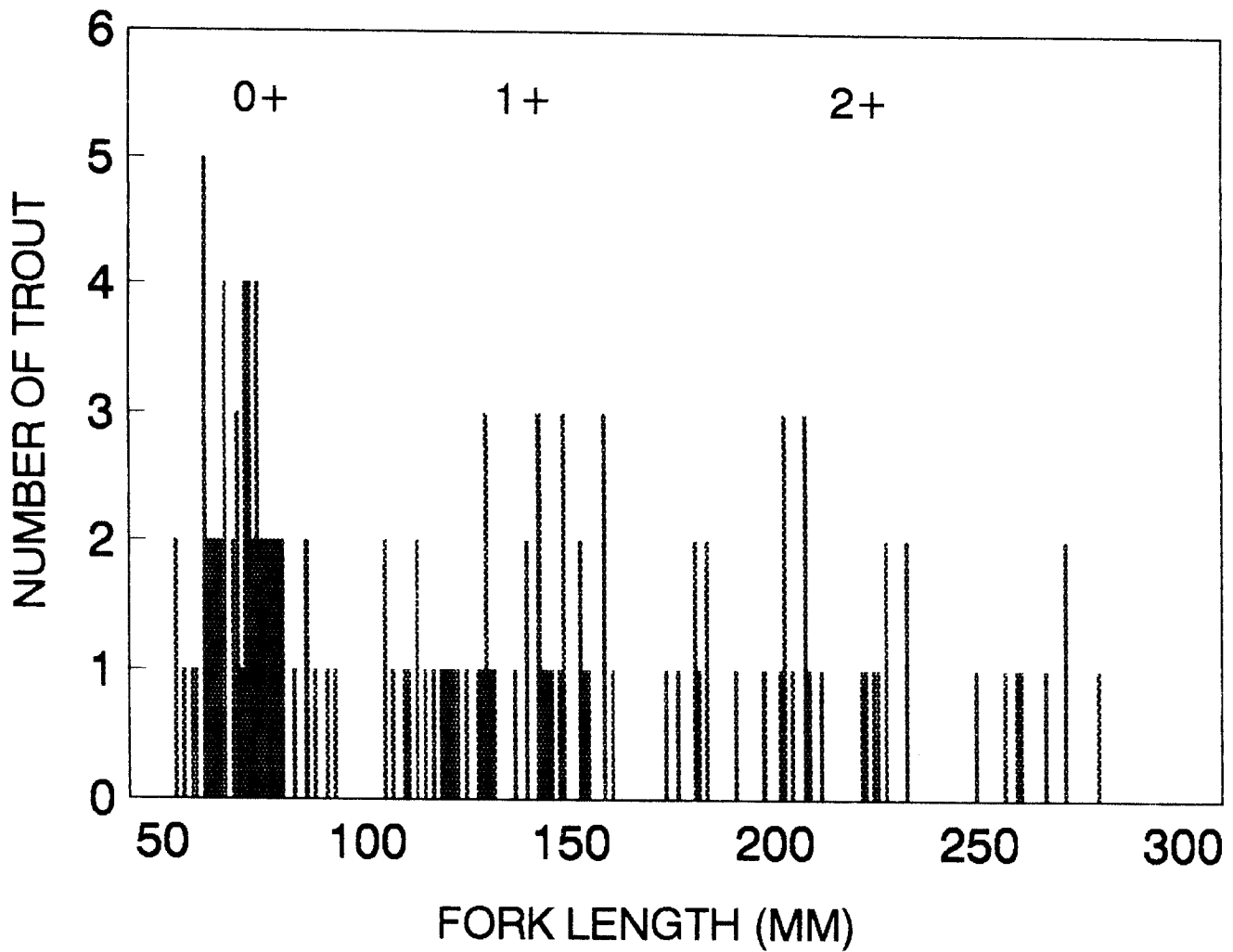$$N = 68 \ (Figure \ 5) \ (Appendix \ 5)$$

FIGURE 2. Length, observed frequency, and age of rainbow trout caught in Little Last Chance Creek, Plumas County, 1988.
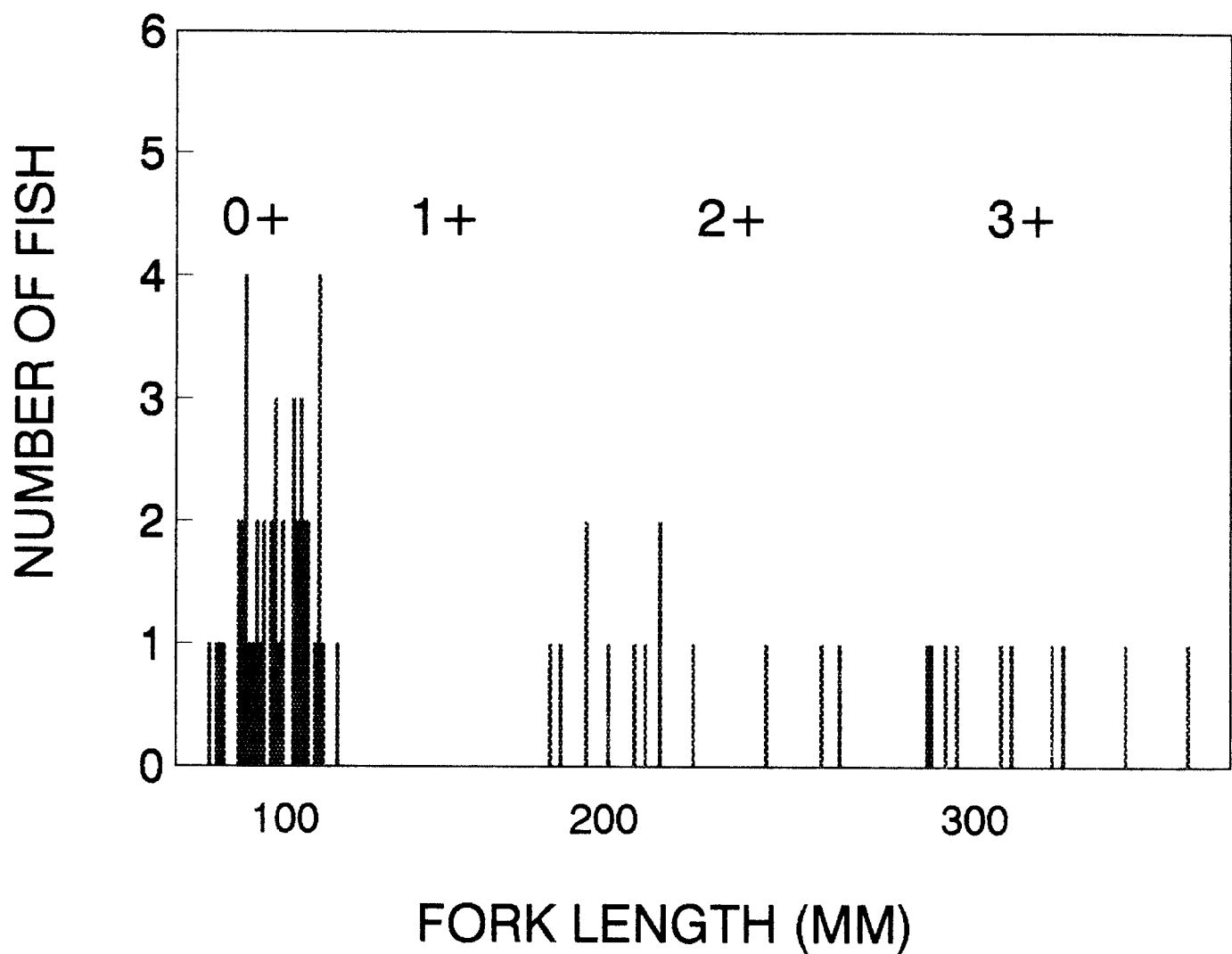
FIGURE 3. Length, observed frequency, and age of brown trout caught in Little Last Chance Creek, Plumas County, 1988.

FIGURE 4. The relationship between length and weight of rainbow trout caught in sections of Little Last Chance Creek, 1988.

The figure shows a scatter plot with WEIGHT (G) on the y-axis (0 to 300) and FORK LENGTH (MM) on the x-axis (0 to 350). The equation shown is:

$$\text{Log}_{10}\, W = -4.7 + 2.9\, \text{Log}_{10}\, L$$
$$r^2 = 0.99$$
$$N = 138$$

$$Log_{10} W = -4.9 + 3.0 \ Log_{10} L$$
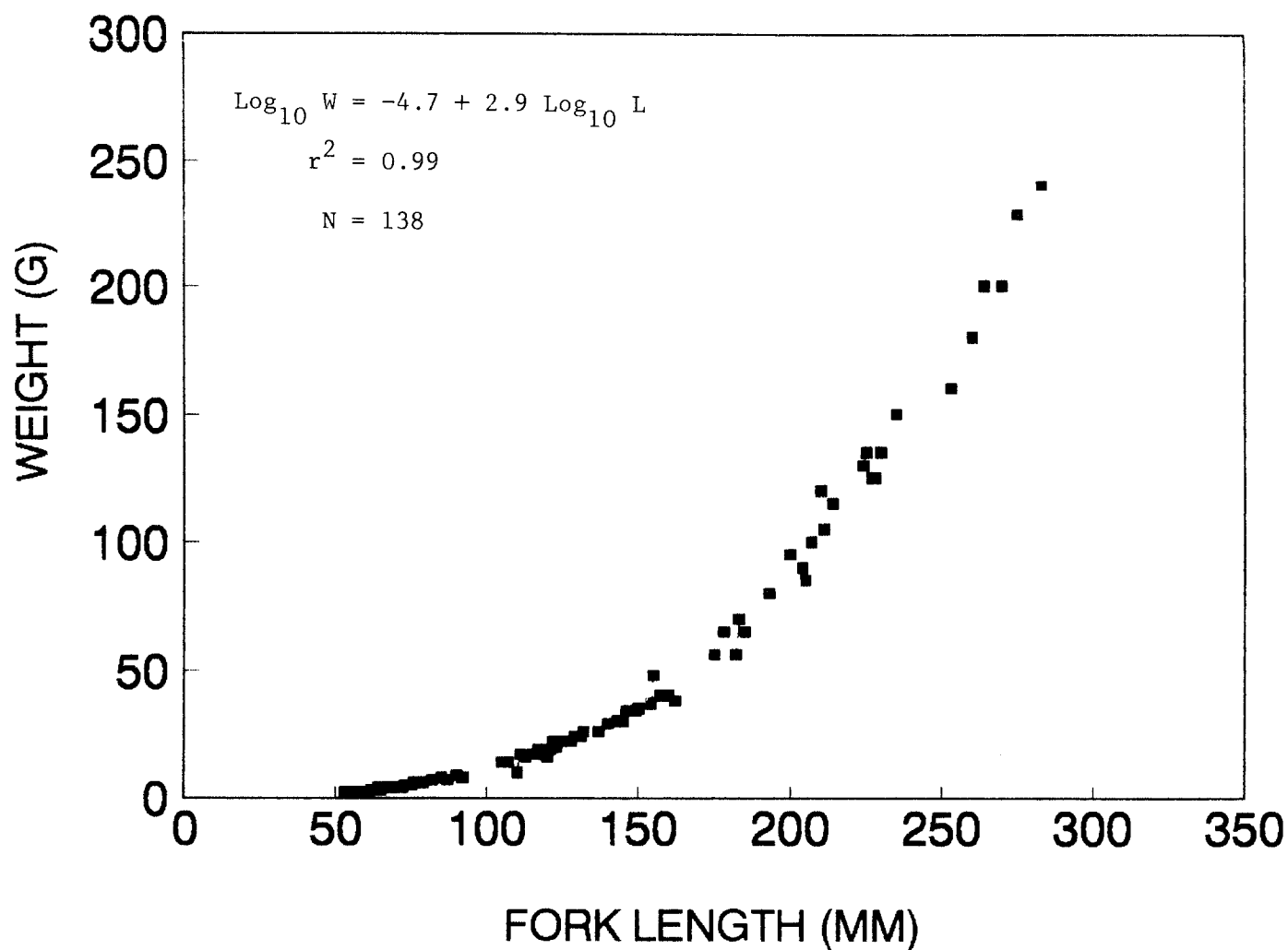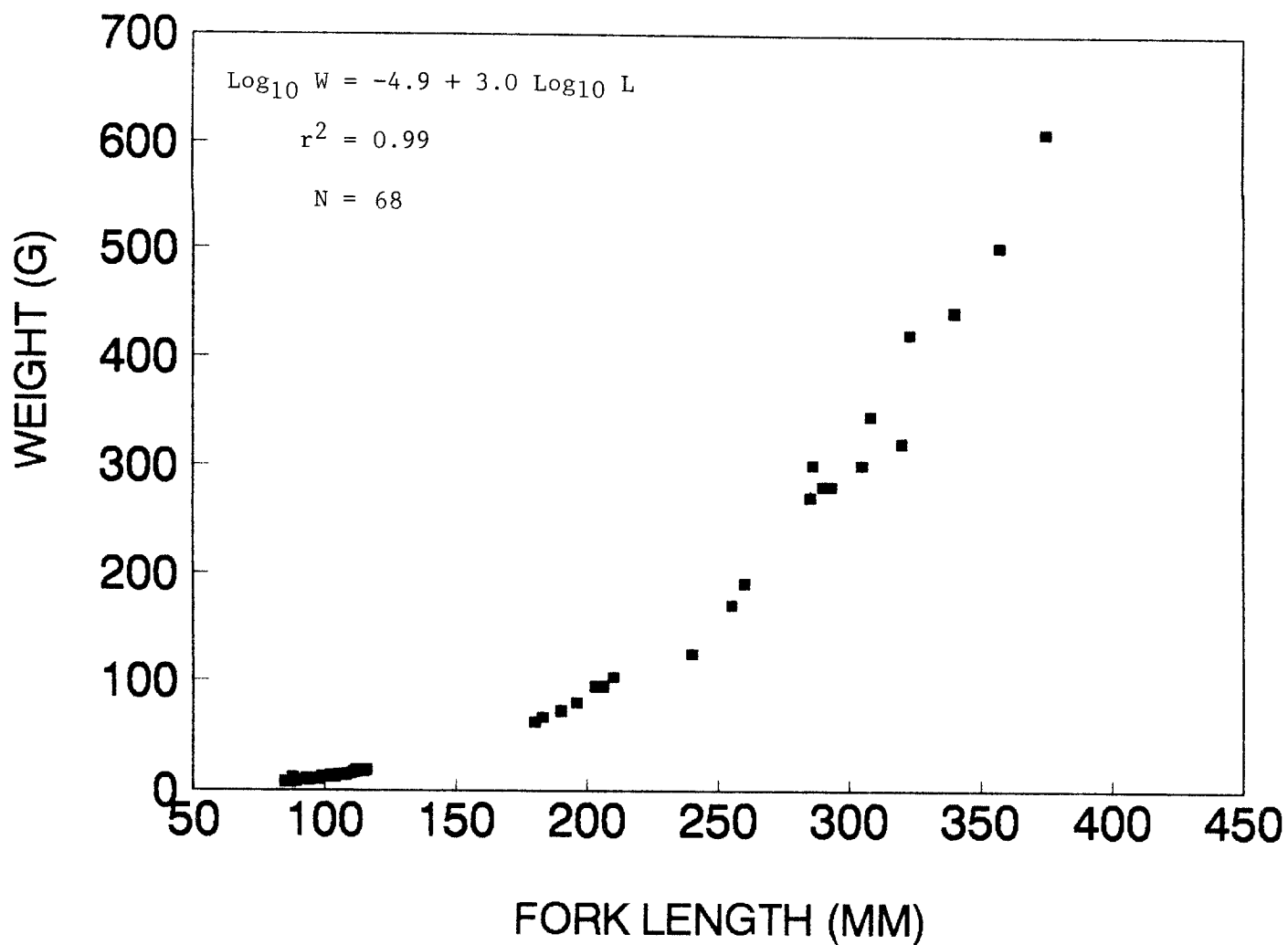
$$r^2 = 0.99$$

$$N = 68$$

FIGURE 5. The relationship between length and weight
of brown trout caught in sections of Little
Last Chance Creek, Plumas County, 1988.

Coefficient of Condition

We calculated the coefficient of condition and 95 percent confidence limits for 130 rainbow trout and 68 brown trout (Table 9).

TABLE 9. Condition of Rainbow Trout and Brown Trout in Little Last Chance Creek, 1988.

Age Group	Number of Fish	Coefficient of Condition	95% Confidence Interval
Rainbow Trout			
0+	66	1.1705	0.8493-1.4916
1+	44	1.0567	0.8828-1.2306
2+	20	1.1187	0.7597-1.4776
Combined	130	1.1330	0.8230-1.4429
Brown Trout			
0+	46	1.1105	0.7091-1.5119
1+	7	1.0573	0.9932-1.0573
2+	11	1.1030	0.9226-1.2834
3+	4	1.0856	0.9575-1.2140
Combined	68	1.1190	0.9088-1.3293

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APPENDIX 1

PERMANENT FISH POPULATION STATIONS FOR
LITTLE LAST CHANCE CREEK, PLUMAS COUNTY
SEPTEMBER 1988

Station 1 (1-Mile Station) - Located 1.6 km below Frenchman Dam
just downstream from the first bridge at elevation of 1659 m MSL
in NW 1/4 of NE 1/4, Section 4, T23N, R16E. This station begins
in a rapid beneath the bridge carrying Frenchman Lake Road, then
enters a pool with a deeply undercut room-sized boulder on the
right bank. The remainder of the station is a short rapid and a
shallow pool/run. About 55 percent of the station is pool and 45
percent rapid. Substrate is boulder, rubble, and sand. The
station is 42.4 m long with a surface area of 234 m^2 and a volume
of 59 m^3 at a flow of 7 cms.

Station 2 (2-Mile Station) - Located 3.2 km below Frenchman Dam
adjacent to the upper end of a large turnout at an elevation of
1610 m MSL in NW 1/4 of SW 1/4, Section 3, T23N, R16E. This
station begins in a large plunge pool followed by two shallow
pool/run areas and two short rapids. About 45 percent of the
station is pool and 55 percent rapid. Substrate is boulder,
rubble, and sand. The station is 41 m long with a surface area
of 192 m^2 and a volume of 58 m^3 at a flow of 7 cms.

Station 3 (Campground Station) - Located 4.4 km below Frenchman
Dam adjacent to the cutoff road in the center of Chilcoot
Campground at an elevation of 1561 m MSL in NE 1/4 of NE 1/4,
Section 10, T23N, R16E. This station begins in a steep rapid
followed by a long pool with undercut right bank, then a short
rapid, a short pool, and finally, another steep rapid. The
station is 40 percent pool and 60 percent rapid. Substrate is
boulders, rubble, and sand. The station is 51 m long with a
surface area of 265 m^2 and a volume of 50.4 m^3 at a flow of 7
cms.

APPENDIX 2

LENGTH AND NUMBER OF RAINBOW TROUT
CAUGHT IN LITTLE LAST CHANCE CREEK, 1988

Fork Length (mm)	Frequency	Fork Length (mm)	Frequency
53	2	129	1
55	1	130	3
57	1	131	1
58	1	132	1
60	5	137	1
61	2	140	2
62	2	143	3
63	2	145	1
64	2	146	1
65	4	147	1
67	2	149	1
68	3	150	3
69	1	154	2
70	4	155	1
71	4	156	1
72	2	160	3
73	4	162	1
74	2	175	1
75	2	178	1
76	2	182	2
77	2	183	1
78	2	185	2
79	2	193	1
82	1	200	1
85	2	204	1
87	1	205	3
90	1	207	1
92	1	210	3
105	2	211	1
107	1	214	1
110	1	224	1
111	1	225	1
113	2	227	1
115	1	228	1
117	1	230	2
119	1	235	2
120	1	253	1
121	1	260	1
122	1	263	1
123	1	264	1
125	1	270	1
128	1	275	2
		283	1

APPENDIX 3

LENGTH AND NUMBER OF BROWN TROUT
CAUGHT IN LITTLE LAST CHANCE CREEK, 1988

Fork Length (mm)	Frequency
85	1
87	1
88	1
89	1
93	2
94	2
95	4
96	1
97	1
98	2
99	1
100	2
102	2
103	3
104	1
105	2
108	2
109	2
110	3
111	2
112	2
114	1
115	3
116	1
120	1
180	1
183	1
190	2
196	1
203	1
206	1
210	2
219	1
240	1
255	1
260	1
285	1
286	1
290	1
293	1
305	1
308	1
320	1
323	1
340	1
357	1
375	1

APPENDIX 4

LENGTH AND WEIGHT OF RAINBOW TROUT
CAUGHT IN LITTLE LAST CHANCE CREEK, 1988

Fork Length (mm)	Weight (g)	Fork Length (mm)	Weight (g)
53	2,2	130	22,24,24
55	2	131	24
57	2	132	26
58	3	137	26
60	2,3,3,3,3	140	28,30
61	2,3	143	28,30,32
62	3,3	145	30
63	3,3	146	34
64	4,4	147	34
65	3,3,3,4	149	34
67	3,5	150	34,36,36
68	3,4,4	154	34,40
69	4	155	48
70	4,4,4,5	156	40
71	4,4,4,5	160	35,42,44
72	3,4	162	38
73	4,4,5,5	175	56
74	5,5	178	65
75	4,6	182	52,60
76	6,6	183	70
77	6,6	185	65,65
78	6,6	193	80
79	6,6	200	95
82	7	204	90
85	7,8	205	75,85,95
87	7	207	100
90	9	210	90,100,170
92	8	211	105
105	12,15	214	115
107	14	224	130
110	10	225	135
111	17	227	125
113	15,17	228	125
115	17	230	130,140
117	19	235	150,150
119	17	253	160
120	16	260	180
121	19	263	210
122	22	264	200
123	20	270	200
125	22	275	220,235
128	22	283	240
129	24		

LENGTH AND WEIGHT OF BROWN TROUT
CAUGHT IN LITTLE LAST CHANCE CREEK, 1988

Fork Length (mm)	Weight (g)
85	7
87	7
88	11
89	8
93	9,10
94	8,10
95	8,9,10,11
96	10
97	9
98	9,10
99	12
100	10,12
102	12,13
103	11,12,13
104	11
105	13,14
108	13,15
109	14,15
110	15,15,16
111	16,16
112	17,18
114	18
115	16,16,16
116	18
120	16
180	62
183	66
190	68,76
196	80
203	95
206	95
210	100,105
219	110
240	125
255	170
260	190
285	270
286	300
290	280
293	280
305	300
308	345
320	320
323	420
340	440
357	500
375	610